



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

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| SERIAL NUMBER | FILING DATE | FIRST NAMED APPLICANT | ATTORNEY DOCKET NO. |
|---------------|-------------|-----------------------|---------------------|
| 06/843,454 | 03/24/86 | BLANCHARD R | M-300 |

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| EXAMINER | |
|-----------|--------------|
| THOMAS, T | |
| ART UNIT | PAPER NUMBER |
| 114 | 2 |

DATE MAILED: 12/31/86

This is a communication from the examiner in charge of your application.

COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892.
2. ☒ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449
4. ☐ Notice of informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☐ Claims 1 - 11 are pending in the application.
Of the above, claims 1 - 7 are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 8 - 11 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).
10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received
☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other _____

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Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1 to 7. drawn to a semiconductor device. classified in Class 357. subclass 23.4.

II. Claims 8-11. drawn to process for making semiconductor devices.. classified in Class 148. subclass 175.

The inventions are distinct. each from the other. because of the following reasons:

Inventions II and I are related as process of making and product made.

The inventions are distinct if either (1) the process as claimed can be used to make another and materially different product. or (2) the product as claimed can be made by another and materially different process. MPEP 806.05(f).

In this case. unpatentability of the group I invention would not necessarily imply unpatentability of the group II invention. since the device of the group I invention could be made by processes materially different than that of the group II invention. for example, instead of forming (uniform) layers and then forming a groove therein. as recited in the method claims, selective epitaxy could be used to grow the layers around the area to be occupied by the "conductive material" gate electrode.

Because these inventions are distinct for the reasons given above and as shown by the above classification, the fields of search are not co-extensive and separate examination would be required. restriction for examination purposes as indicated is proper.

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During a telephone conversation with applicant's representative Mr. Kenneth Leeds on Oct. 27, 1986 a provisional election was made without waiver of the right to traverse to prosecute the invention of II, claims 8-11. Affirmation of this election must be made by applicant in responding to this Office action. Claims 1-7 are withdrawn from further consideration by the examiner as being drawn to a nonelected invention. See 37 CFR 1.142(b).

The oath is objected to as being informal. It lacks authentication by a diplomatic or consular officer of the United States; 37 CFR 1.66(a). This informality can be overcome either by forwarding the original oath to the appropriate officer for authentication or by filing a declaration (37 CFR 1.68), if applicant wishes to preserve the original filing date. If authentication is desired, applicant should request return of the oath for this purpose. Such request must be accompanied by an order for a copy of the oath to be retained in the file until the properly authenticated oath is returned. After the oath has been authenticated, it should be returned promptly to the Patent and Trademark Office. The new oath or declaration must properly identify the application of which it is to form a part, preferably by Serial Number and filing date in the body of the oath or declaration. See MPEP 602.01 and 602.02.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide best mode of carrying out invention.

The process of making connection to the doped

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polysilicon filler is not described at all. Such a connection to gate region is very essential for device operations.

The term "MOS gated SCR" is confusing. Prior art does not provide any supporting evidence that such a four layer pn pn structure would function as a SCR.

Claims 8-11 are rejected under 35 U.S.C. 112. first paragraph. for the reasons set forth in the above objection to the specification.

Claims 9 and 11 are rejected under 35 U.S.C. 112. fourth paragraph, as being of improper dependent form for failing to further limit the subject matter of a previous claim.

The claims 8 and 10 are to a MOSFET formed in groove. By forming a p+ layer instead of n+ layer as claimed in claims 9 and 11 the device transforms to a four layer power device.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title. if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person. which qualifies as prior art only under subsection (f) and (g) of section 102 of this title. shall not preclude patentability under this section where the subject matter and the claimed invention were. at

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the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 8 and 10 are rejected under 35 U.S.C. 103 as being unpatentable over admitted prior art in view of Kazuya.

The admitted prior art lacks anticipation only in filling up the groove with polysilicon and planarizing it.

It is noted that polysilicon gate is formed over gate oxide on groove sidewalls.

Kazuya teaches the planarization of U-grooves by filling up with doped polysilicon, etching the upper layer polysilicon and subsequently oxidizing the polysilicon.

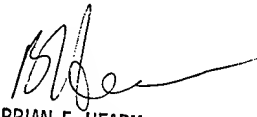
So it would be obvious to one of ordinary skill in the art to use Kazuya's planarization process in admittedly prior U-groove FET process since it will provide a smooth substrate surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Thomas whose telephone number is (703) 557-3593.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 557-2517.

TThomas:tp

12/22/86
12/24/86


BRIAN E. HEARN
SUPERVISORY PRIMARY EXAMINER
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